

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
540 S. MORRIS AVE., MONTGOMERY, AL 36115
RA226 ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #1100244

Project: Dimock Residential GW Site, Dimock, PA
Analysis method: Radium-226 in Water: Rapid Method for High-Activity Samples
Report ID: 1100244-RA226
Report type: Original
Date reported: 03/29/2012
Total pages in report: 30

SAMPLES

NAREL Sample #	Client Sample ID	Location	Matrix	Date Collected	Date Received
B2.01214P	HW06	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01263Z	HW26	PA:DIMOCK	WATER-DRINKING	01/31/2012	02/01/2012
B2.01264A	HW26-P	PA:DIMOCK	WATER-DRINKING	01/31/2012	02/01/2012
B2.01265B	HW18	PA:DIMOCK	WATER-DRINKING	01/30/2012	02/01/2012
B2.01266C	HW18-P	PA:DIMOCK	WATER-DRINKING	01/30/2012	02/01/2012
B2.01267D	HW20	PA:DIMOCK	WATER-DRINKING	01/30/2012	02/01/2012
B2.01268E	HW20-P	PA:DIMOCK	WATER-DRINKING	01/30/2012	02/01/2012
B2.01269F	FB06	PA:DIMOCK	WATER-DRINKING	01/30/2012	02/01/2012
B2.01270Y	HW13	PA:DIMOCK	WATER-DRINKING	01/30/2012	02/01/2012
B2.01271Z	HW25-P	PA:DIMOCK	WATER-DRINKING	01/30/2012	02/01/2012
B2.01322T	HW33	PA:DIMOCK	WATER-DRINKING	02/01/2012	02/02/2012
B2.01323U	HW33A-P	PA:DIMOCK	WATER-DRINKING	02/01/2012	02/02/2012
B2.01324V	HW32	PA:DIMOCK	WATER-DRINKING	02/01/2012	02/02/2012
B2.01325W	HW32-P	PA:DIMOCK	WATER-DRINKING	02/01/2012	02/02/2012
B2.01326X	HW29Z	PA:DIMOCK	WATER-DRINKING	01/31/2012	02/02/2012
B2.01327Y	HW35A	PA:DIMOCK	WATER-DRINKING	01/31/2012	02/02/2012
B2.01328Z	FB07	PA:DIMOCK	WATER-DRINKING	01/31/2012	02/02/2012
B2.01329A	HW29	PA:DIMOCK	WATER-DRINKING	01/31/2012	02/02/2012
B2.01330T	HW52	PA:DIMOCK	WATER-DRINKING	01/31/2012	02/02/2012
B2.01331U	HW33B-P	PA:DIMOCK	WATER-DRINKING	02/01/2012	02/02/2012

EXCEPTIONS

1. **Packaging and shipping**—No problems were observed.
2. **Documentation**—No problems were observed.
3. **Sample preparation**—No problems were encountered.
4. **Analysis**— During counting, samples B2.01263, B2.01264, B2.01271, B2.01271 DUP, and B2.01330 had peaks that shifted from their normal region-of-interest (ROI) due to attenuation. The ROIs were manually adjusted, and the results are reported in this data package.
5. **Holding times**—No holding times were specified.

QUALITY CONTROL

1. **QC samples**—All QC analysis results met NAREL acceptance criteria.
2. **Yields**—All chemical yields were within acceptance limits.
3. **Instruments**—Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Director of the Center for Environmental Radioanalytical Laboratory Science and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.

Mary Wisdom

Mary F. Wisdom
Quality Assurance Manager, NAREL

4-3-12

Date

John G. Griggs (Acting CERLs Dir) *4-5-12*

John G. Griggs, Ph.D.
Director, Center for Environmental Radioanalytical
Laboratory Science

Date

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Method blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

ANALYSIS SUMMARY

Analysis Procedure: NAREL RA226-EICHRON
Title: Radium-226 in Water: Rapid Method for High-Activity Samples

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Assay Batch #	QC Batch #
B2.01214P	DUP	N/A	03/07/2012	0015773U	0008520W
B2.01263Z		N/A	03/07/2012	0015773U	0008520W
B2.01264A		N/A	03/07/2012	0015773U	0008520W
B2.01265B		N/A	03/07/2012	0015773U	0008520W
B2.01266C		N/A	03/07/2012	0015773U	0008520W
B2.01267D		N/A	03/07/2012	0015773U	0008520W
B2.01268E		N/A	03/07/2012	0015773U	0008520W
B2.01269F		N/A	03/08/2012	0015779A	0008520W
B2.01270Y		N/A	03/08/2012	0015779A	0008520W
B2.01271Z		N/A	03/08/2012	0015779A	0008520W
B2.01271Z		N/A	03/08/2012	0015779A	0008520W
B2.01322T		N/A	03/08/2012	0015779A	0008520W
B2.01323U		N/A	03/08/2012	0015779A	0008520W
B2.01324V		N/A	03/08/2012	0015779A	0008520W
B2.01325W		N/A	03/08/2012	0015779A	0008520W
B2.01326X		N/A	03/09/2012	0015786Z	0008520W
B2.01327Y		N/A	03/09/2012	0015786Z	0008520W
B2.01328Z		N/A	03/09/2012	0015786Z	0008520W
B2.01329A		N/A	03/09/2012	0015786Z	0008520W
B2.01330T		N/A	03/09/2012	0015786Z	0008520W
B2.01331U		N/A	03/09/2012	0015786Z	0008520W
LCS-00632510H *	LCS	N/A	03/09/2012	0015786Z	0008520W
RBK-00632509Q *	RBK	N/A	03/07/2012	0015773U	0008520W

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

PREPARATION METHOD(S) USED

Procedure ID	Title

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01214P	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015773U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/06/2012 16:12	1000.0	AS33	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	7.40e-01	2.4e-01	1.1e-01	PCI/L	03/05/2012 12:53 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01263Z	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015773U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/06/2012 16:12	1000.0	AS34	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.39e+00	3.2e-01	1.0e-01	PCI/L	03/05/2012 12:14 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01264A	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015773U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/06/2012 16:12	1000.0	AS35	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226 *	1.36e+00	3.2e-01	1.3e-01	PCI/L	03/05/2012 12:11 CST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01265B	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015773U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/06/2012 16:12	1000.0	AS36	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	2.93e-01	1.5e-01	1.5e-01	PCI/L	03/05/2012 11:55 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01266C	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015773U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/06/2012 16:12	1000.0	AS37	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	2.10e-01	1.3e-01	1.0e-01	PCI/L	03/05/2012 12:06 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01267D	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015773U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/06/2012 16:12	1000.0	AS39	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	-4.82e-03	5.7e-02	1.3e-01	PCI/L	03/05/2012 12:02 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01268E	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015773U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/06/2012 16:12	1000.0	AS40	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.52e-02	5.6e-02	1.1e-01	PCI/L	03/05/2012 12:01 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01269F	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015779A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-BICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/07/2012 16:20	1000.0	AS35	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	4.40e-02	7.8e-02	1.3e-01	PCI/L	03/06/2012 10:40 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01270Y	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015779A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/07/2012 16:20	1000.0	AS36	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.17e-01	1.0e-01	1.3e-01	PCI/L	03/06/2012 11:00 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01271Z	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015779A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHR
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/07/2012 16:20	1000.0	AS37	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	9.42e-01	2.7e-01	9.5e-02	PCI/L	03/06/2012 10:44 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01271Z	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015779A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/07/2012 16:20	1000.0	AS39	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226 *	9.75e-01	2.6e-01	1.4e-01	PCI/L	03/06/2012 10:51 CST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01322T	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015779A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/07/2012 16:20	1000.0	AS40	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.22e-01	9.9e-02	1.1e-01	PCI/L	03/06/2012 10:53 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01323U	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015779A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/07/2012 16:20	1000.0	AS42	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.07e-01	8.9e-02	9.5e-02	PCI/L	03/06/2012 11:09 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01324V	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015779A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/07/2012 16:20	1000.0	AS43	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	4.24e-01	1.9e-01	1.3e-01	PCI/L	03/06/2012 10:55 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01325W	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015779A
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/07/2012 16:20	1000.0	AS44	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	5.28e-01	1.9e-01	6.9e-02	PCI/L	03/06/2012 10:47 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01326X	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015786Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/08/2012 14:58	1000.0	AS44	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	3.58e-01	1.6e-01	7.0e-02	PCI/L	03/07/2012 12:01 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01327Y	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015786Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/08/2012 14:58	1000.0	AS47	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	7.22e-02	7.7e-02	8.8e-02	PCI/L	03/07/2012 12:11 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01328Z	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015786Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHR
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/08/2012 14:58	1000.0	AS48	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	8.84e-02	8.4e-02	8.9e-02	PCI/L	03/07/2012 12:03 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01329A	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015786Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHR
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/08/2012 14:58	1000.0	AS74	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226 *	2.79e-01	1.3e-01	5.7e-02	PCI/L	03/07/2012 12:20 CST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01330T	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015786Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/08/2012 14:58	1000.0	AS78	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	2.57e-01	1.5e-01	1.2e-01	PCI/L	03/07/2012 12:11 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	B2.01331U	QC batch #:	0008520W
Matrix:	WATER-DRINKING	Assay batch #:	0015786Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/08/2012 14:58	1000.0	AS79	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	1.03e-01	8.7e-02	1.0e-01	PCI/L	03/07/2012 12:16 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	LCS-00632510H	QC batch #:	0008520W
Matrix:	N/A	Assay batch #:	0015786Z
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/08/2012 14:58	1000.0	AS80	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	3.24e+00	3.0e-01	1.8e-02	PCI	03/07/2012 12:13 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100244

SAMPLE ANALYSIS REPORT

Sample #:	RBK-00632509Q	QC batch #:	0008520W
Matrix:	N/A	Assay batch #:	0015773U
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL RA226-EICHRO
Dry/wet weight:	N/A	Analyst:	PH
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/06/2012 16:12	1000.0	AS44	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ra226	2.28e-02	1.9e-02	1.4e-02	PCI	03/05/2012 11:54 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG 1100244

QC BATCH SUMMARY

QC batch #: 0008520W
Preparation procedure: N/A
Analysis procedure: NAREL RA226-EICHRM

NAREL Sample #	QC Type	Yield (%)	$\pm 2 \sigma$ Uncertainty (%)	Analyst
B2.01214P	DUP	83.98 %	7.22 %	PH
B2.01263Z		87.38 %	7.24 %	PH
B2.01264A		87.58 %	7.35 %	PH
B2.01265B		85.14 %	7.09 %	PH
B2.01266C		78.92 %	6.85 %	PH
B2.01267D		92.63 %	7.48 %	PH
B2.01268E		89.36 %	7.32 %	PH
B2.01269F		85.58 %	7.23 %	PH
B2.01270Y		96.68 %	7.78 %	PH
B2.01271Z		85.49 %	7.25 %	PH
B2.01271Z		87.39 %	7.23 %	PH
B2.01322T		88.77 %	7.32 %	PH
B2.01323U		96.48 %	7.87 %	PH
B2.01324V		79.42 %	6.88 %	PH
B2.01325W		89.25 %	7.48 %	PH
B2.01326X		87.79 %	7.67 %	PH
B2.01327Y		91.69 %	7.89 %	PH
B2.01328Z		89.87 %	7.75 %	PH
B2.01329A		86.62 %	7.08 %	PH
B2.01330T		80.02 %	7.25 %	PH
B2.01331U		86.75 %	7.10 %	PH
LCS-00632510H *	LCS	92.70 %	7.36 %	PH
RBK-00632509Q *	RBK	87.51 %	7.34 %	PH

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0008520W

Analytical Method: NAREL RA226-EICHRON

METHOD BLANKS (PCI)

Sample ID	Nuclide	Activity $\pm 2\sigma$	Prep Date	Flags
00632509Q	RA226	$2.28e-02 \pm 1.9e-02$	2012-03-05	OK

LABORATORY DUPLICATES (PCI/L)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
B2.01271Z	RA226	$9.42e-01 \pm 2.7e-01$	$9.75e-01 \pm 2.6e-01$	3.43	0.18 OK

LAB CONTROL SAMPLES (PCI)

Sample ID	Nuclide	Amt Added $\pm 2\sigma$	Measured $\pm 2\sigma$	%R	Z
00632510H	RA226	$3.37e+00 \pm 3.4\%$	$3.24e+00 \pm 3.0e-01$	96.29	-0.78 OK

Analyst:

Patricia Honsa
Honsa, Patricia

22 Mar 2012

QA Officer:

Carl J. McPherson

3/22/12

Method Blanks

Analyte: RA226

Method: NAREL RA226-EICHRUM

Analyst: Honsa, Patricia

PH 22 Nov 2012

Report: 1100244-RA226

